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Distribution and tectonic significance of crustal seismicity at South-Iberian margins

F. Fernández-Ibáñez and J. I. Soto

Instituto Andaluz de Ciencias de la Tierra (CSIC-Granada University), Campus Fuentenueva s/n, 18002-Granada, Spain (fferiba@ugr.es).

Diffuse deformation and strain partitioning characterize the boundary between the African and Eurasian plates in the Betics-Rif-Alboran region (Western Mediterranean), as is shown by the seismicity pattern with abundant scattered seismic swarms. Focal depth distribution of earthquakes shows that most of the seismicity is located in the crust (86%) and preferentially in the upper, brittle crust (90% of the crustal seismicity at $<$15 km). 3-D modelling of the yield strength envelope, based on the thermal regime and lithosphere structure, demonstrates that most of the seismicity in the Betics and the Alboran Sea (the South-Iberian margin) tends to nucleate in the brittle domains, resulting in a gap between uppermost crustal and lithosphere mantle intermediate seismicity. However the tectonic significance of some events located in the deep crust still remains a substantial problem that would be addressed.

Although earthquakes are not large in magnitude in the South-Iberian Margin (mostly M_s $<$3.5), major structures in the area disclose active tectonic processes controlling landscape. Active fault structures, combined with geomorphological indicators (e.g. surface slope analysis) and raised marine terraces distributed along the coast, point out a lengthy event of tectonically controlled uplift . Besides, we have identified some seismogenic fault structures in offshore areas (most of them cutting up the surface or the seafloor) that may control the configuration and most recent evolution of the entire margin. Focal mechanisms from large earthquakes (M_w $>$3.5) unveil blatant stress axes rotation along the Cartagena to Almería margins, from strike-slip to normal, with minor reverse, fault mechanisms, coinciding with a dramatic crustal thinning that mimic the current coastal line.

Future outlooks in this project will be focused in relations between seismicity and

fault structures that extend onshore, and examining the thermal regime to constrain seismicity distribution and rupture mode of faulting.